

A. Howard W. Sams

TUBE SUBSTITUTION handbook

- American Receiving Tubes
- Industrial Receiving Tubes
- European Receiving Tubes
- Picture Tubes

A. Howard W. Sams
®

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TUBE SUBSTITUTION HANDBOOK

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TABLE OF CONTENTS

INTRODUCTION	5
--------------------	---

SECTION 1

Cross Reference of American Receiving Tubes	7
---	---

SECTION 2

Industrial Substitutes For Receiving Tubes	55
--	----

SECTION 3

European Substitutes For American Types	59
---	----

SECTION 4

American Substitutes For European Types	67
---	----

SECTION 5

Picture Tube Substitutes	79
--------------------------------	----

INTRODUCTION

The first section of this book lists *all* receiving tubes which have been or are being manufactured in this country. Also included are the latest tube types registered with EIA but not yet in production. The tubes are listed in the left-hand column. The substitutes in the right-hand column are for only those tubes which have similar, or improved, characteristics and can be inserted directly into the socket. No rewiring or mechanical changes are needed, although the associated service controls may have to be readjusted.

In some instances, the available space around the tube should be considered. For example, although electrically identical to a 6L6GB, a 6L6G is more than one inch taller and a half inch larger in diameter. Thus, the substitution may be physically impossible in some compact equipment.

When making substitutes, do not replace tubes in the right-hand column with those in the left-hand column because this may result in a tube with lesser qualifications being used. For example, the 6AX4 is shown as a substitute for the 6W4. However, where a high heater-to-cathode potential exists, the 6AX4 will hold up, whereas the 6W4 will not. Therefore, a 6AX4 obviously should not be replaced by a 6W4.

When no substitutes are shown, this indicates that none are recommended. You should then check Section 2 to see if it gives an industrial replacement. Section 2 lists those receiving tubes that can be substituted by industrial tubes. Industrial tubes are more rugged than receiving tubes in that their peak ratings and power-handling characteristics are much higher. Therefore, it may be desirable from time to time to substitute an industrial tube to get more satisfactory results. The receiving tubes are listed in the left-hand column and the industrial substitutes in the right-hand column.

Sections 3 and 4 list American and European equivalents. If you have an American tube and want to know what European type will serve as a substitute, refer to Section 3. Here

you will find the American tubes listed in the left-hand column and the European substitutes in the right-hand column. If you have a European tube, and need to know what American type can be used as a substitute, refer to Section 4. The European tubes are listed in the left-hand column and the American substitutes in the right-hand column. These listings are very useful because a large amount of foreign-made equipment is being sold in this country and all foreign tubes are not stocked in the parts stores. It is much handier to replace a foreign tube with an American tube from your own stock.

The fifth section of this book lists picture tubes and their substitutes. This section lists *all* picture tubes—from 10-inch to 30-inch. Although there are tubes smaller than 10 inch, they are practically out of date and only one or two have substitutes. For this reason, they have been omitted from the list. Again, you will find no substitutes shown for some tubes because none are recommended. Always pay particular attention to any notes pertaining to a substitute, since some minor changes may be necessary before the substitute will work satisfactorily.

Section 1

CROSS REFERENCE OF AMERICAN RECEIVING TUBES

This section lists all American receiving tubes and their recommended substitutes. To use this listing, first locate the tube number you need a substitute for in the left-hand column. Then refer to the right-hand column for the substitute.

The listing of a certain tube type as a substitute does not necessarily mean the reverse is true. So be sure to look only in the left-hand column for the tube to be replaced.

Substitutes marked with an asterisk (*) should be used only when the filament of the original tube is wired in a parallel circuit. Those tubes marked with a section symbol (§) may not work in all circuits.

• RECEIVING TUBES • OA2-1AH4 •

<i>To Replace</i>	<i>Use</i>
OA2	
OA3	VR175
OA4G	
OA5	
OB2	
OB3	VR90
OC2	
OC3	VR105
OD3	VR150
OY4	OY4G
OY4G	OY4
OZ4	OZ4A, OZ4G (may require shield)
OZ4A	OZ4, OZ4G (may require shield)
OZ4G	OZ4, OZ4A
1A3	
1A4	1A4P, 1A4T
1A4P	1A4, 1A4T
1A4T	1A4, 1A4P
1A5G	1A5GT, 1T5GT
1A5GT	1A5G, 1T5GT
1A6	
1A7G	1A7GT
1A7GT	1A7G
1AB5	
1AB6	
1AC5	1V5
1AC6	
1AD4	
1AD5	
1AE4	
1AF4	
1AF5	
1AG4	
1AG5	
1AH4	

<i>To Replace</i>	<i>Use</i>
1AH5	
1AJ4	
1AJ5	
1AK4	
1AK5	
1AM4	1T4SF
1AN5	
1AQ5	1R5SF
1AR5	
1AS5	1U5SF
1AX2	
1B3	1B3GT, 1G3GT, 1G3GT/1B3GT, 1J3, 1J3GT, 1K3, 1N2
1B3GT	1B3, 1G3GT, 1G3GT/1B3GT, 1J3, 1J3GT, 1K3, 1N2
1B4P	1B4T, 32, 951
1B4T	1B4P, 32, 951
1B5	1B5/25S, 25, 25S
1B5/25S	1B5, 25, 25S
1B6	
1B7G	1B7GT
1B7GT	1B7G
1B8GT	
1C3	
1C5G	1C5GT, 1Q5G, 1Q5GT
1C5GT	1C5G, 1Q5G, 1Q5GT
1C6	
1C7G	
1C8	1E8
1D5G	1D5GP, 1D5GT
1D5GP	1D5G, 1D5GT
1D5GT	1D5G, 1D5GP
1D7G	
1D8GT	
1DN5	1U5

• RECEIVING TUBES 1E3-1J3GT •

<i>To Replace</i>	<i>Use</i>
1E3	
1E4G	1E4GT
1E4GT	1E4G
1E5G	1E5GP, 1E5GT
1E5GP	1E5G, 1E5GT
1E5GT	1E5G, 1E5GP
1E7G	1E7GT
1E7GT	1E7G
1E8	1C8
1F4	
1F5G	
1F6	
1F7G	1F7GH, 1F7GV
1F7GH	1F7G, 1F7GV
1F7GV	1F7G, 1F7GH
1G3GT	1G3GT/1B3GT, 1B3, 1B3GT, 1J3, 1J3GT, 1K3GT, 1N2
1G3GT/1B3GT	1B3, 1B3GT, 1G3GT, 1J3, 1J3GT, 1K3, 1N2
1G4G	1G4GT
1G4GT	1G4G
1G5G	1G5GT, 1J5G
1G5GT	1G5G, 1J5G
1G6G	1G6GT
1G6GT	1G6G
1H2	
1H4G	1H4GT
1H4GT	1H4G
1H5G	1H5GT
1H5GT	1H5G
1H6G	1H6GT
1H6GT	1H6G
1J3	1J3GT, 1B3, 1B3GT, 1G3GT, 1G3GT/ 1B3GT, 1K3, 1N2
1J3GT	1J3, 1B3, 1B3GT, 1G3GT, 1G3GT/ 1B3GT, 1K3, 1N2

<i>To Replace</i>	<i>Use</i>
1J5G	1G5G, 1G5GT
1J6G	1J6GT
1J6GT	1J6G
1K3	1K3GT, 1B3, 1B3GT, 1G3GT, 1G3GT/ 1B3GT, 1J3, 1J3GT, 1N2
1K3GT	1K3, 1B3, 1B3GT, 1G3GT, 1G3GT/ 1B3GT, 1J3, 1J3GT, 1N2
1L4	
1L6	
1LA4	1LA4E
1LA4E	1LA4
1LA6	
1LB4	
1LB6	
1LC5	1LN5
1LC6	1LA6
1LD5	
1LE3	1LF3
1LF3	1LE3
1LG5	
1LH4	
1LN5	
1M3	1N3
1N2	
1N3	1M3
1N5G	1N5GT
1N5GT	1N5G
1N6G	1N6GT
1N6GT	1N6G
1P5G	1P5GT
1P5GT	1P5G
1Q5G	1Q5GT, 1C5G, 1C5GT
1Q5GT	1Q5G, 1C5G, 1C5GT
1Q6	

● RECEIVING TUBES 1R4-2AF4A ●

<i>To Replace</i>	<i>Use</i>
1R4	
1R5	
1R5SF	1AQ5
1S2	1S2A
1S2A	1S2
1S4	
1S5	
1SA6GT	
1SB6GT	
1T2	
1T4	
1T4SF	1AM4
1T5GT	1A5G, 1A5GT
1U4	
1U5	1DN5
1U5SF	1AS5
1U6	
1V	6Z3
1V2	
1V5	1AC5
1V6	
1W4	
1X2	1X2A, 1X2B
1X2A	1X2B
1X2B	
1Z2	
2A3	2A3H
2A3H	2A3
2A4G	
2A5	
2A6	
2A7	2A7S
2A7S	2A7
2AF4	2AF4A, 2AF4B
2AF4A	2AF4B

<i>To Replace</i>	<i>Use</i>
2AF4B	
2B3	
2B5	
2B7	2B7S
2B7S	2B7
2BN4	2BN4A
2BN4A	2BN4
2CY5	2EA5, 2EV5
2E5	
2EA5	2CY5, 2EV5
2EN5	
2ER5	2ES5, 2FH5
2ES5	2FH5
2EV5	2EA5, 2CY5
2FH5	2ES5
2FV6	
2G5	
2J2	
2S/4S	
2T4	
2V2	
2V3G	
2W3	2W3GT
2W3GT	2W3
2X2	2X2A, 879, 2X2/879
2X2A	2X2, 879, 2X2/879
2Z2/G84	
3A2	
3A3	
3A8GT	
3AF4A	
3AJ8	
3AL5	
3AU6	3BA6
3AV6	

* Parallel-filament circuits only.

§ May not work in all circuits.

● RECEIVING TUBES ● 3B2-3GS8

<i>To Replace</i>	<i>Use</i>
3B2	3A3
3B7	
3BA6	3AU6
3BC5	3CE5
3BE6	3CS6
3BN4	3BN4A
3BN4A	3BN4
3BN6	
3BU8	3GS8
3BX6	3BY7
3BY6	
3BY7	3BX6
3BZ6	3CB6, 3CF6, 3DK6
3C2	
3C4	3E5
3C5GT	3Q5, 3Q5G, 3Q5GT
3C6	XXB
3CB6	3BZ6, 3CF6, 3DK6
3CE5	3BC5
3CF6	3BZ6, 3CB6, 3DK6
3CS6	3BE6
3CY5	3EA5, 3EV5
3D6	
3DK6	3BZ6, 3CB6, 3CF6
3DT6	
3E5	3C4
3E6	
3EA5	3CY5, 3EV5
3EH7	
3EJ7	
3ER5	3ES5, 3FH5
3ES5	3FH5
3EV5	3CY5, 3EA5
3FH5	3ES5
3GS8	3BU8

<i>To Replace</i>	<i>Use</i>
3LE4	
3LF4	
3Q4	
3Q5G	3Q5GT, 3C5GT
3Q5GT	3Q5G, 3C5GT
3S4	
3S4SF	3W4, 3W4/3S4SF
3V4	
3W4	3S4SF, 3W4/3S4SF
3W4/3S4SF	3W4, 3S4SF
3Z4	
4AU6	4BA6
4BA6	4AU6
4BC5	4CE5
4BC8	4BQ7A, 4BS8, 4BX8, 4BZ7, 4BZ8, 4CX7, 5BK7A
4BE6	4CS6
4BL8	
4BN4	
4BN6	
4BQ7A	4BC8, 4BS8, 4BX8, 4BZ7, 4BZ8, 4CX7, 5BK7A
4BS8	4BC8, 4BQ7A, 4BX8, 4BZ7, 4BZ8, 4CX7, 5BK7A
4BU8	4GS8
4BX8	4BC8, 4BQ7A, 4BS8, 4BZ7, 4BZ8, 4CX7, 5BK7A
4BZ6	4CB6, 4DE6, 4DK6
4BZ7	4BC8, 4BQ7A, 4BS8, 4BX8, 4BZ8, 4CX7, 5BK7A
4BZ8	4BC8, 4BQ7A, 4BS8, 4BX8, 4BZ7, 4CX7, 5BK7A
4CB6	4BZ6, 4DE6, 4DK6
4CE5	4BC5
4CM4	

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
4CS6	4BE6
4CX7	4BC8, 4BQ7A, 4BS8, 4BX8, 4BZ7, 4BZ8, 5BK7A
4CY5	
4DE6	4BZ6, 4CB6, 4DK6
4DK6	4BZ6, 4CB6, 4DE6
4DT6	
4EH7	
4EJ7	
4ES8	
4EW6	
4GS8	4BU8
5AM8	
5AN8	
5AQ5	
5AR4	
5AS4	5AS4A, 5DB4, 5U4GB
5AS4A	5AS4, 5DB4, 5U4GB
5AS8	
5AT8	5CG8
5AU4	5V3
5AV8	5B8§
5AW4	5AS4, 5AS4A, 5AU4, 5DB4, 5R4GYB, 5U4GA, 5U4GB, 5V3
5AX4GT	5AR4, 5R4GY, 5R4GYA, 5R4GYB, 5T4
5AZ4	5AR4, 5AX4GT, 5CG4, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4G, 5V4GA, 5Y3G, 5Y3GA, 5Y3GT, 5Z4, 5Z4G, 5Z4GT
5B8	5AV8§
5BE8	5BR8§, 5CL8§, 5CL8A§, 5FV8§
5BK7A	4BC8, 4BQ7A, 4BS8, 4BX8, 4BZ7, 4BZ8, 4CX7
5BQ7A	5BS8, 5BZ7
5BR8	5BE8§, 5CL8§, 5CL8A§, 5FV8§
5BS8	5BQ7A, 5BZ7

<i>To Replace</i>	<i>Use</i>
5BT8	
5BW8	
5BZ7	5BQ7A, 5BS8
5CG4	5AR4, 5Z4, 5Z4G, 5Z4GT
5CG8	5AT8
5CL8	5CL8A, 5BE8§, 5BR8§, 5FV8§
5CL8A	5CL8, 5BE8§, 5BR8§, 5FV8§
5CM6	5CZ5
5CM8	
5CQ8	5EA8§, 5GH8§, 5U8§
5CR8	
5CU4	
5CZ5	
5DB4	5AS4, 5AS4A, 5U4GB
5DH8	
5EA8	5GH8, 5U8, 5CQ8§
5EH8	
5EU8	
5FV8	5BE8§, 5BR8§, 5CL8§, 5CL8A§
5GH8	5EA8, 5U8, 5CQ8§
5J6	
5R4GY	5R4GYA, 5R4GYB
5R4GYA	5R4GY, 5R4GYB
5R4GYB	
5T4	5AR4, 5R4GYB
5T8	
5U4G	5U4GA, 5U4GB, 5AR4, 5AS4, 5AS4A, 5DB4, 5R4GYB, 5T4
5U4GA	5U4GB, 5AS4, 5AS4A, 5DB4, 5R4GYB
5U4GB	5AS4, 5AS4A, 5DB4
5U8	5EA8, 5GH8, 5CQ8§
5V3	5AU4
5V4G	5V4GA, 5AR4
5V4GA	5V4G, 5AR4
5V6GT	

<i>To Replace</i>	<i>Use</i>
5W4	5W4G, 5W4GT, 5AR4, 5AZ4, 5CG4, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4G, 5V4GA, 5Y3G, 5Y3GA, 5Y3GT, 5Z4, 5Z4G, 5Z4GT
5W4G	5W4, 5W4GT, 5AR4, 5AZ4, 5CG4, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4G, 5V4GA, 5Y3G, 5Y3GA, 5Y3GT, 5Z4, 5Z4G, 5Z4GT
5W4GT	5W4, 5W4G, 5AR4, 5AZ4, 5CG4, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4G, 5V4GA, 5Y3G, 5Y3GA, 5Y3GT, 5Z4, 5Z4G, 5Z4GT
5X3	13, 80
5X4G	5X4GA
5X4GA	
5X8	
5Y3G	5Y3GA, 5Y3GT, 5AR4, 5AX4GT, 5AZ4, 5CG4, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4, 5V4GA, 5Z4, 5Z4G, 5Z4GT
5Y3GA	5Y3G, 5Y3GT, 5AR4, 5AX4GT, 5AZ4, 5CG4, 5R4GY, 5Y4GYA, 5R4GYB, 5T4, 5V4, 5V4GA, 5Z4, 5Z4G, 5Z4GT
5Y3GT	5Y3G, 5Y3GA, 5AR4, 5AX4GT, 5AZ4, 5CG4, 5R4GY, 5R4GYA, 5R4GYB, 5T4, 5V4, 5V4GA, 5Z4, 5Z4G, 5Z4GT
5Y4G	5Y4GA, 5Y4GT
5Y4GA	5Y4G, 5Y4GT
5Y4GT	5Y4G, 5Y4GA
5Z3	83
5Z4	5Z4G, 5Z4GT, 5AR4, 5CG4, 5V4G, 5V4GA
5Z4G	5Z4, 5Z4GT, 5AR4, 5CG4, 5V4G, 5V4GA
5Z4GT	5Z4, 5Z4G, 5AR4, 5CG4, 5V4G, 5V4GA
6A3	

<i>To Replace</i>	<i>Use</i>
6A4	
6A5G	
6A6	
6A7	6A7S
6A7S	6A7
6A8	6A8G, 6A8GT
6A8G	6A8, 6A8GT
6A8GT	6A8, 6A8G
6AB4	
6AB5	6N5
6AB6G	6N6G*
6AB7	
6AB8	
6AC5G	6AC5GT
6AC5GT	6AC5G
6AC6GT	
6AC7	6AJ7
6AD5G	6AD5GT
6AD5GT	6AD5G
6AD6G	
6AD7G	
6AD8	
6AE5G	6AE5GT, 6AF5G
6AE5GT	6AE5G, 6AF5G
6AE6G	
6AE7G	6AE7GT
6AE7GT	6AE7G
6AE8	
6AF3	
6AF4	6AF4A
6AF4A	6AF4
6AF5G	6AE5G, 6AE5GT
6AF6G	6AF6GT
6AF6GT	6AF6G
6AF7G	

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
6AG5	6BC5, 6CE5, 6AK5*, 6CY5*§, 6EA5*§, 6EV5*§
6AG6G	6M6G*
6AG7	6AK7
6AH4GT	
6AH5G	
6AH6	6AH6V
6AH6V	6AH6
6AH7GT	
6AJ4	
6AJ5	
6AJ7	6AC7
6AJ8	
6AK4	
6AK5	6AG5*, 6BC5*, 6CE5*, 6CY5*§, 6EA5*§, 6EV5*§
6AK6	
6AK7	6AG7
6AK8	6T8, 6T8A
6AL5	
6AL7GT	
6AM4	
6AM5	
6AM6	
6AM8	6AM8A
6AM8A	6AM8*
6AN4	
6AN5	
6AN6	
6AN7	
6AN8	6AN8A
6AN8A	6AN8*
6AQ4	
6AQ5	6AQ5A
6AQ5A	6AQ5*

<i>To Replace</i>	<i>Use</i>
6AQ6	6AT6*, 6AV6*, 6BK6*, 6BT6*
6AQ7GT	
6AQ8	6DT8*
6AR5	6AQ5*§, 6AQ5A*§
6AR6	
6AR7GT	
6AR8	
6AS5	
6AS6	
6AS7G	6AS7GA, 6080
6AS7GA	6AS7G, 6080
6AS8	
6AT6	6AV6, 6BK6, 6BT6, 6AQ6*
6AT8	6AT8A, 6CG8, 6CG8A
6AT8A	6CG8A, 6AT8*, 6CG8*
6AU4GT	6AU4GTA, 6CQ4, 6DA4A, 6DE4
6AU4GTA	6CQ4
6AU5GT	6AV5GA, 6AV5GT
6AU6	6AU6A, 6BA6, 7543
6AU6A	6AU6*, 7543*, 6BA6*
6AU7	7AU7
6AU8	6AU8A, 6AW8, 6AW8A
6AU8A	6AU8, 6AW8, 6AW8A
6AV4	6BX4*
6AV5GA	6AV5GT, 6AU5GT
6AV5GT	6AV5GA, 6AU5GT
6AV6	6AT6, 6BK6, 6BT6, 6AQ6*
6AW7GT	
6AW8	6AW8A, 6AU8, 6AU8A, 6EB8*
6AW8A	6AW8, 6AU8, 6AU8A, 6EB8*
6AX4GT	6AX4GTA, 6AX4GTB, 6CQ4*, 6DA4, 6DA4A, 6DE4*
6AX4GTA	6AX4GTB, 6CQ4*, 6DA4, 6DA4A, 6DE4*
6AX4GTB	6DA4A*
6AX5GT	

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
6AX6G	
6AX7	
6AX8	6U8, 6U8A, 6GH8, 6EA8, 6GJ8*, 6CQ8§
6AZ8	
6B3	
6B4G	
6B5	
6B6G	6Q7, 6Q7G, 6Q7GT
6B7	6B7S
6B7S	6B7
6B8	6B8G, 6B8GT
6B8G	6B8, 6B8GT
6B8GT	6B8, 6B8G
6BA5	
6BA6	6AU6, 6AU6A
6BA7	
6BA8	6BA8A, 6BH8
6BA8A	6BA8, 6BH8
6BC4	
6BC5	6CE5, 6AG5, 6AK5*, 6CY5*§, 6EA5*§, 6EV5*§
6BC7	
6BC8	6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ7, 6BZ8, 6CX7, 6CH7, X155, 6BK7*, 6BK7A*, 6BK7B*
6BD4	6BD4A
6BD4A	
6BD5GT	6AV5GT, 6AV5GA, 6AU5GT
6BD6	
6BD7	
6BE6	6CS6
6BE7	
6BE8	6BE8A, 6BR8§, 6BR8A§, 6CL8§, 6CL8A§, 6FV8§
6BE8A	6BE8*, 6BR8*§, 6BR8A§, 6CL8§, 6CL8A§, 6FV8§

<i>To Replace</i>	<i>Use</i>
6BF5	
6BF6	6BU6
6BF7	6BF7A, 6BG7
6BF7A	6BF7, 6BG7
6BG6G	6BG6GA
6BG6GA	6BG6G
6BG7	6BF7, 6BF7A
6BH5	
6BH6	
6BH8	6BA8, 6BA8A
6BJ5	
6BJ6	6BJ6A
6BJ6A	6BJ6
6BJ7	
6BJ8	
6BK4	
6BK5	
6BK6	6AT6, 6AV6, 6BT6, 6AQ6*
6BK7	6BK7A, 6BK7B, 6BC8*, 6BQ7*, 6BQ7A*, 6BS8*, 6BX8*, 6BZ7*, 6BZ8*, 6CH7*, 6CX7*, X155
6BK7A	6BK7, 6BK7B, 6BC8*, 6BQ7*, 6BQ7A*, 6BS8, 6BX8*, 6BZ7*, 6BZ8*, 6CH7*, 6CX7*, X155*
6BK7B	6BK7*, 6BK7A, 6BC8*, 6BQ7*, 6BQ7A*, 6BS8*, 6BX8*, 6BZ7*, 6BZ8*, 6CH7*, 6CX7*, X155*
6BK8	
6BL4	6AU4GT, 6AU4GTA
6BL7GT	6BL7GTA, 6DN7, 6BX7GT
6BL7GTA	6BL7GT, 6BX7GT, 6DN7
6BL8	
6BM5	
6BM8	
6BN4	6BN4A

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
6BN4A	6BN4
6BN5	
6BN6	
6BN7	
6BN8	
6BQ5	7189, 7189A
6BQ6G	6BQ6GA, 6BQ6GTA, 6BQ6GTB, 6BQ6GTB/6CU6, 6CU6, 6DQ6, 6DQ6A, 6DQ6B, 6FH6
6BQ6GA	6BQ6G, 6BQ6GTA, 6BQ6GTB, 6BQ6GTB/6CU6, 6CU6, 6DQ6, 6DQ6A, 6DQ6B, 6FH6
6BQ6GT	6BQ6G, 6BQ6GA, 6BQ6GTA, 6BQ6GTB, 6BQ6GTB/6CU6, 6CU6, 6DQ6, 6DQ6A, 6DQ6B, 6FH6
6BQ6GTA	6BQ6G, 6BQ6GA, 6BQ6GTB, 6BQ6GTB/ 6CU6, 6CU6, 6DQ6, 6DQ6A, 6DQ6B, 6FH6
6BQ6GTB	6BQ6GTB/6CU6, 6CU6, 6DQ6, 6DQ6A, 6DQ6B, 6FH6
6BQ6GTB/6CU6	6BQ6GTB, 6CU6, 6DQ6, 6DQ6A, 6DQ6B, 6FH6
6BQ7	6BQ7A, 6BC8, 6BS8, 6BX8, 6BZ7, 6BZ8, 6CH7, 6CX7, X155, 6BK7*, 6BK7A*, 6BK7B*
6BQ7A	6BQ7, 6BC8, 6BS8, 6BX8, 6BZ7, 6BZ8, 6CH7, 6CX7, X155, 6BK7*, 6BK7A*, 6BK7B*
6BR5	
6BR7	
6BR8	6BR8A, 6BE8§, 6BE8A§, 6CL8§, 6CL8A§, 6FV8§
6BR8A	6BR8*, 6BE8*§, 6BE8A§, 6CL8§, 6CL8A§, 6FV8§
6BS5	

<i>To Replace</i>	<i>Use</i>
6BS7	
6BS8	6BC8, 6BQ7, 6BQ7A, 6BX8, 6BZ7, 6BZ8, 6CH7, 6CX7, X155, 6BK7*, 6BK7A*, 6BK7B*
6BT4	
6BT6	6AT6, 6AV6, 6BK6, 6AQ6*
6BT8	
6BU4	
6BU5	
6BU6	6BF6
6BU8	6GS8
6BV7	
6BV8	
6BW4	
6BW6	
6BW7	
6BW8	
6BX4	6AV4*
6BX6	6BY7, 6EC7*
6BX7GT	6BL7GT, 6BL7GTA
6BX8	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BZ7, 6BZ8, 6CH7, 6CX7, X155, 6BK7*, 6BK7A*, 6BK7B*
6BY4	
6BY5G	6BY5GA
6BY5GA	6BY5G
6BY6	
6BY7	6BX6, 6EC7*
6BY8	
6BZ6	6CB6, 6CB6A, 6CF6, 6DE6, 6DK6
6BZ7	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ8, 6CH7, 6CX7, X155, 6BK7*, 6BK7A*, 6BK7B*
6BZ8	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ7, 6CH7, 6CX7, X155, 6BK7*, 6BK7A*, 6BK7B*

<i>To Replace</i>	<i>Use</i>
6C4	
6C5	6C5G, 6C5GT, 6J5, 6J5G, 6J5GT
6C5G	6C5, 6C5GT, 6J5, 6J5G, 6J5GT
6C5GT	6C5, 6C5G, 6J5, 6J5G, 6J5GT
6C6	77, 57AS*
6C7	
6C8G	
6CA4	
6CA5	
6CA7	
6CB5	6CB5A, 6CL5
6CB5A	6CL5
6CB6	6CB6A, 6BZ6, 6CF6, 6DE6, 6DK6
6CB6A	6CB6*, 6BZ6*, 6CF6*, 6DE6*, 6DK6*
6CD6G	6CD6GA, 6DN6, 6EX6
6CD6GA	6EX6
6CD7	
6CE5	6BC5, 6AG5, 6AK5*, 6CY5*§, 6EA5*§, 6EV5*§
6CF6	6BZ6, 6CB6, 6CB6A, 6DE6, 6DK6
6CG6	
6CG7	
6CG8	6CG8A, 6AT8, 6AT8A
6CG8A	6AT8A, 6CG8*, 6AT8*
6CH6	
6CH7	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ7, 6BZ8, 6CX7, X155, 6BK7*, 6BK7A*, 6BK7B*
6CH8	
6CJ5	
6CK4	
6CJ6	6DR6
6CK5	
6CK6	

<i>To Replace</i>	<i>Use</i>
6CL5	
6CL6	
6CL8	6CL8A, 6BE8A§, 6BR8A§, 6FV8§, 6BE8*§, 6BR8*§
6CL8A	6CL8, 6BE8A§, 6BR8A§, 6FV8§, 6BE8*§, 6BR8*§
6CM4	
6CM5	
6CM6	6CZ5
6CM7	
6CM8	
6CN6	
6CN7	
6CQ4	
6CQ6	
6CQ8	6U8A§, 6EA8§, 6GH8§, 6U8*§, 6AX8*§, 6GJ8*§
6CR4	
6CR5	
6CR6	
6CR8	
6CS5	
6CS6	6BE6
6CS7	
6CS8	
6CT7	
6CU5	
6CU6	6BQ6GTB, 6BQ6GTB/6CU6, 6DQ6, 6DQ6A, 6DQ6B, 6FH6
6CU7	
6CU8	
6CV7	
6CW5	
6CX7	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ7, 6BZ8, 6CH7, X155, 6BK7*, 6BK7A*, 6BK7B*

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
6CX8	6AU8*, 6AU8A*, 6AW8*, 6AW8A*
6CY5	6EA5, 6EV5, 6AG5*§, 6AK5*§, 6BC5*§, 6CE5*§
6CY7	
6CZ5	
6D5G	
6D6	78, 58AS*
6D7	
6D8	6D8G
6D8G	6D8
6DA4	6DA4A, 6CQ4, 6DE4
6DA4A	6CQ4, 6DE4
6DA5	
6DA6	6DG7*
6DA7	
6DB5	
6DB6	
6DC6	6BZ6, 6CB6, 6CB6A, 6CF6, 6DE6, 6DK6
6DC8	
6DE4	6AU4GT, 6AU4GTA, 6CQ4, 6DA4A
6DE6	6BZ6, 6CB6, 6CB6A, 6CF6, 6DC6, 6DK6
6DE7	
6DG6GT	6W6GT, 6EF6, 6EY6, 6EZ5
6DG7	6DA6*
6DJ8	6ES8, 6FW8*
6DK6	6BZ6, 6CB6, 6CB6A, 6CF6, 6DC6, 6DE6
6DL5	
6DL7	
6DN6	6EX6, 6CD6G, 6CD6GA
6DN7	
6DQ5	
6DQ6	6DQ6A, 6DQ6B, 6FH6
6DQ6A	6DQ6B, 6FH6
6DQ6B	

To Replace	Use
6DR6	6CJ6
6DR7	
6DR8	
6DS5	
6DS8	
6DT5	
6DT6	
6DT8	6AQ8*
6DW5	
6DX8	
6DY5	
6DY7	
6DZ7	
6DZ8	
6E5	
6E6	
6E7	
6E8G	
6EA5	6EV5, 6CY5, 6AG5*§, 6AK5*§, 6BC5*§, 6CE5*§
6EA7	6EM7
6EA8	6U8A, 6GH8, 6CQ8§, 6AX8*, 6GJ8*
6EB5	
6EB8	6GN8, 6AU8*, 6AU8A*
6EC7	6BX6*, 6BY7*
6EF6	6DG6GT, 6EY6, 6EZ5, 6W6GT
6EH5	
6EH7	
6EH8	
6EJ7	
6EM5	
6EM7	6EA7
6ER5	6ES5*, 6FH5*
6ES5	6FH5, 6ER5*
6ES6	6ET6

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
6ES8	6DJ8, 6FW8*
6ET6	6ES6
6ET7	
6EU7	
6EU8	
6EV5	6EA5, 6CY5, 6AG5*§, 6AK5*§, 6BC5*§, 6CE5*§
6EV7	
6EW6	6GM6
6EW7	
6EX6	
6EY6	6EF6, 6EZ5
6EZ5	6EF6, 6EY6
6EZ8	
6F4	
6F5	6F5G, 6F5GT
6F5G	6F5, 6F5GT
6F5GT	6F5, 6F5G
6F6	6F6G, 6F6GT
6F6G	6F6, 6F6GT
6F6GT	6F6, 6F6G
6F7	6F7S
6F7S	6F7
6F8G	
6FE5	
6FG6	
6FH5	6ER5, 6ES5*
6FH6	6DQ6B
6FH8	
6FM8	
6FV6	
6FV8	6BE8A§, 6BR8A§, 6CL8§, 6CL8A§, 6BE8*§, 6BR8*§
6FW8	6DJ8*, 6ES8*
6G5	6G5/6H5, 6H5, 6U5/6G5, 6U5

<i>To Replace</i>	<i>Use</i>
6G5/6H5	6G5, 6H5, 6U5/6G5, 6U5
6G6G	
6GA8	6CG7*
6GC6	
6GE8	
6GH8	6EA8, 6U8A, 6CQ8§, 6AX8*, 6GJ8*, 6U8*
6GJ8	6AX8*, 6EA8*, 6GH8*, 6U8*, 6U8A*, 6CQ8*§
6GK6	
6GM6	6EW6
6GN6	
6GN8	6EB8, 6AU8*, 6AU8A*, 6AW8*, 6AW8A*
6GS8	6BU8
6H4	6H4GT
6H4GT	6H4
6H5	6G5, 6G5/6H5, 6U5, 6U5/6G5
6H6	6H6G, 6H6GT
6H6G	6H6, 6H6GT
6H6GT	6H6, 6H6G
6HC8	
6J4	
6J5	6J5G, 6J5GT, 6C5, 6C5G, 6C5GT
6J5G	6J5, 6J5GT, 6C5, 6C5G, 6C5GT
6J5GT	6J5, 6J5G, 6C5, 6C5G, 6C5GT
6J6	6J6A
6J6A	6J6*
6J7	6J7G, 6J7GT
6J7G	6J7, 6J7GT
6J7GT	6J7, 6J7G
6J8G	
6K5G	6K5GT
6K5GT	6K5G
6K6GT	

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
6K7	6K7G, 6K7GT, 6U7G
6K7G	6K7, 6K7GT, 6U7G
6K7GT	6K7, 6K7G, 6U7G
6K8	6K8G, 6K8GT
6K8G	6K8, 6K8GT
6K8GT	6K8, 6K8G
6L4	
6L5G	
6L6	6L6G, 6L6GA, 6L6GB, 6L6GC, 5881, 7581
6L6G	6L6, 6L6GA, 6L6GB, 6L6GC, 5881, 7581
6L6GA	6L6, 6L6G, 6L6GB, 6L6GC, 5881, 7581
6L6GB	6L6, 6L6G, 6L6GA, 6L6GB, 5881, 7581
6L6GC	7581
6L7	6L7G
6L7G	6L7
6M3	
6M5	
6M6G	6AG6G*
6M7G	
6M8GT	
6N3	
6N4	
6N5	6AB5
6N6G	6AB6G*
6N7	6N7G, 6N7GT
6N7G	6N7, 6N7GT
6N7GT	6N7, 6N7G
6N8	
6P5GT	
6P7G	
6Q4	
6Q6	6Q6G
6Q6G	6Q6
6Q7	6Q7G, 6Q7GT, 6B6G

<i>To Replace</i>	<i>Use</i>
6Q7G	6Q7, 6Q7GT, 6B6G
6Q7GT	6Q7, 6Q7G, 6B6G
6R3	
6R4	
6R6G	
6R7	6R7G, 6R7GT
6R7G	6R7, 6R7GT
6R7GT	6R7, 6R7G
6R8	
6S2	6S2A
6S2A	6S2
6S4	6S4A
6S4A	
6S7	6S7G
6S7G	6S7
6S8GT	
6SA7	6SA7G, 6SA7GT
6SA7G	6SA7, 6SA7GT
6SA7GT	6SA7, 6SA7G
6SB7Y	
6SC7	6SC7GT
6SC7GT	6SC7
6SD7GT	6SE7GT
6SE7GT	6SD7GT
6SF5	6SF5GT
6SF5GT	6SF5
6SF7	
6SG7	6SG7GT
6SG7GT	6SG7
6SH7	6SH7GT
6SH7GT	6SH7
6SJ7	6SJ7GT
6SJ7GT	6SJ7
6SK7	6SK7G, 6SK7GT, 6SS7* 6SS7GT*
6SK7G	6SK7, 6SK7GT, 6SS7*, 6SS7GT*

* Parallel-filament circuits only. § May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
6SK7GT	6SK7, 6SK7G, 6SS7*, 6SS7GT*
6SL7GT	6SU7WGT
6SN7GT	6SN7GTA, 6SN7GTB
6SN7GTA	6SN7GTB
6SN7GTB	6SN7GTA*
6SQ7	6SQ7G, 6SQ7GT, 6SZ7*
6SQ7G	6SQ7, 6SQ7GT, 6SZ7*
6SQ7GT	6SQ7, 6SQ7G, 6SZ7*
6SR7	6SR7GT, 6ST7*
6SR7GT	6SR7, 6ST7*
6SS7	6SS7GT, 6SK7*, 6SK7G*, 6SK7GT*
6SS7GT	6SS7, 6SK7*, 6SK7G*, 6SK7GT*
6ST7	6SR7*, 6SR7GT*
6SV7	
6SZ7	6SQ7*, 6SQ7G*, 6SQ7GT*
6T4	
6T5	6G5, 6G5/6H5, 6H5, 6U5/6G5, 6U5
6T6	
6T7G	
6T8	6T8A, 6AK8
6T8A	6T8*, 6AK8*
6U3	
6U4GT	6AX4GT, 6AX4GTA, 6AX4GTB, 6CQ4, 6DA4, 6DA4A, 6W4GT
6U5	6G5, 6G5/6H5, 6H5, 6T5, 6U5/6G5
6U6GT	6Y6G, 6Y6GA, 6Y6GT
6U7G	6K7, 6K7G, 6K7GT
6U8	6U8A, 6EA8, 6GH8, 6AX8, 6GJ8*
6U8A	6U8*, 6EA8, 6GH8, 6AX8*, 6GJ8*, 6CQ8§
6V3	6V3A
6V3A	6V3
6V4	6CA4
6V5G	6V5GT
6V5GT	6V5G

<i>To Replace</i>	<i>Use</i>
6V6	6V6GT, 6V6GTA, 7408
6V6GT	6V6, 6V6GTA, 7408
6V6GTA	6V6*, 6V6GT*, 7408*
6V7G	
6V8	
6W4GT	6AX4GT, 6AX4GTA, 6AX4GTB, 6CQ4, 6DA4, 6DA4A, 6U4GT
6W5G	
6W6GT	6DG6GT, 6EF6, 6EY6, 6EZ5
6W7G	
6X4	6BX4, 6AV4*
6X5	6X5G, 6X5GT
6X5G	6X5, 6X5GT
6X5GT	6X5, 6X5G
6X8	6X8A
6X8A	6X8*
6Y3G	
6Y5	6Y5V
6Y5V	6Y5
6Y6G	6Y6GA, 6Y6GT, 6U6GT
6Y6GA	6Y6G, 6Y6GT, 6U6GT
6Y6GT	6Y6G, 6Y6GA, 6U6GT
6Y7G	
6Z3	1V
6Z4	84, 84/6Z4
6Z5	12Z5, 6Z5/12Z5
6Z5/12Z5	6Z5, 12Z5
6Z7G	
6ZY5G	
7A4	XXL
7A5	
7A6	
7A7	7B7*
7A8	
7AB7	

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
7AD7	
7AF7	
7AG7	7AH7, 7G7*
7AH7	7AG7, 7B7, 7L7*
7AJ7	7C7*
7AK7	
7AN7	
7AU7	6AU7
7B4	
7B5	
7B6	7C6*
7B7	7AH7, 7A7*
7B8	
7C4	
7C5	
7C6	7B6*
7C7	7AJ7*
7D7	
7DJ8	
7E5	
7E6	
7E7	
7ED7	
7EY6	
7F7	
7F8	
7G7	7AG7*
7G8	
7H7	
7J7	
7K7	
7L7	7AH7*
7N7	
7Q7	
7R7	

<i>To Replace</i>	<i>Use</i>
7S7	
7T7	
7V7	
7W7	
7X6	
7X7	XXFM
7Y4	
7Z4	
8AU8	8AU8A, 8AW8A
8AU8A	8AU8, 8AW8A
8AW8A	8AU8, 8AU8A
8B8	
8BA8A	8BH8
8BH8	8BA8A
8BN8	
8BQ5	
8BQ7A	
8CG7	
8CM7	
8CN7	
8CS7	
8CW5	
8CX8	
8CY7	
8EB8	8GN8
8EM5	
8ET7	
8GN8	8EB8
8SN7GTB	
9A8	
9AK8	
9AQ8	
9AU7	
9BR7	
9BR8	9CL8§

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
9BW6	
9CL8	
9DZ8	
9EF6	
9EN7	
9GB8	
9U8	9U8A
9U8A	
9X8	
10	210T
10C8	
10DA7	
10DE7	
10DR7	
10EB8	
10EG7	
10EW7	
11	
11C5	
11CY7	
12	
12A4	
12A5	
12A6	12A6GT
12A6GT	12A6
12A7	
12A8	12A8G, 12A8GT
12A8G	12A8, 12A8GT
12A8GT	12A8, 12A8G
12AB5	
12AC5	
12AC6	
12AD5	
12AD6	
12AD7	12AX7*, 12AX7A*, 12DF7*, 12DM7*, 12DT7*, 7025*, 7025A*

<i>To Replace</i>	<i>Use</i>
12AE6	12AE6A, 12FT6
12AE6A	12AE6, 12FT6
12AE7	
12AF3	
12AF6	12BL6
12AG6	
12AH6	
12AH7GT	
12AH8	
12AJ6	
12AJ7	
12AL5	
12AL8	
12AQ5	
12AS5	
12AT6	12AV6, 12BK6, 12BT6
12AT7	12AZ7*, 12AZ7A*
12AU6	12BA6
12AU7	12AU7A
12AU7A	12AU7
12AV5GA	
12AV6	12AT6, 12BK6, 12BT6
12AV7	
12AW6	
12AX4GT	12AX4GTA, 12AX4GTB, 12D4, 12D4A
12AX4GTA	12AX4GTB, 12D4, 12D4A
12AX4GTB	
12AX7	12AX7A, 12DF7, 12DT7, 7025,, 7025A, 12DM7*, 12AD7*
12AX7A	12AX7, 12DF7, 12DT7, 7025, 7025A, 12AD7*, 12DM7*
12AY7	
12AZ7	12AZ7A, 12AT7*
12AZ7A	12AZ7*, 12AT7*

* Parallel-filament circuits only. § May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
12B3	
12B4	12B4A
12B4A	12B4*
12B7	14A7/12B7, 14A7, 14H7
12B8GT	
12BA6	12AU6
12BA7	
12BD6	
12BE6	12CS6
12BF6	12BU6
12BH7	12BH7A
12BH7A	12BH7*
12BK5	
12BK6	12AT6, 12AV6, 12BT6
12BL6	12AF6
12BM5	
12BN6	
12BQ6GA	12BQ6GTA, 12BQ6GTB, 12BQ6GTB/ 12CU6, 12CU6, 12DQ6, 12DQ6A, 12DQ6B
12BQ6GT	12BQ6GA, 12BQ6GTA, 12BQ6GTB, 12BQ6GTB/12CU6, 12CU6, 12DQ6, 12DQ6A, 12DQ6B
12BQ6GTA	12BQ6GTB, 12BQ6GTB/12CU6, 12CU6, 12DQ6, 12DQ6A, 12DQ6B
12BQ6GTB	12BQ6GTB/12CU6, 12CU6, 12DQ6, 12DQ6A, 12DQ6B
12BQ6GTB/ 12CU6	12BQ6GTB, 12CU6, 12DQ6, 12DQ6A, 12DQ6B
12BR7	12BR7A
12BR7A	12BR7*
12BT6	12AT6, 12AV6, 12BK6
12BU6	12BF6
12BV7	12BY7, 12BY7A, 12DQ7
12BW4	

<i>To Replace</i>	<i>Use</i>
12BX6	
12BY7	12BY7A, 12BV7, 12DQ7
12BY7A	12BY7*, 12DQ7, 12BV7*
12BZ6	
12BZ7	
12C5	12C5/12CU5, 12CU5, 12R5
12C5/12CU5	12C5, 12CU5, 12R5
12C8	
12CA5	
12CM6	
12CN5	
12CR5	
12CR6	
12CS5	
12CS6	12BE6
12CT8	
12CU5	12C5, 12C5/12CU5, 12R5
12CU6	12BQ6GTB, 12BQ6GTB/12CU6, 12DQ6, 12DQ6A, 12DQ6B
12CX6	
12CY6	
12D4	12D4A, 12AX4GTB
12D4A	
12DB5	
12DE8	
12DF5	
12DF7	12AX7, 12AX7A, 12DT7, 7025, 7025A, 12AD7*, 12DM7*
12DK5	
12DK7	
12DL8	
12DM5	
12DM7	12AD7*, 12AX7*, 12AX7A*, 12DF7*, 12DT7*, 7025*, 7025A*
12DQ6	12DQ6A, 12DQ6B

* Parallel-filament circuits only. § May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
12DQ6A	12DQ6B
12DQ6B	
12DQ7	12BY7A, 12BY7*, 12BV7*
12DS7	12DS7A
12DS7A	12DS7
12DT5	
12DT6	
12DT7	12AX7, 12AX7A, 12DF7, 7025, 7025A, 12AD7*, 12DM7*
12DT8	
12DU7	
12DV7	
12DV8	
12DW5	
12DW7	7247
12DW8	
12DY8	
12DZ6	12EA6
12DZ8	
12E5GT	
12EA6	12DZ6
12EC8	
12ED5	
12EF6	
12EG6	
12EH5	
12EK6	
12EL6	
12EM6	
12EN6	12L6GT, 12W6GT
12EZ6	
12F5GT	
12F8	
12FA6	
12FB5	

<i>To Replace</i>	<i>Use</i>
12FK6	
12FM6	
12FQ8	
12FR8	
12FT6	12AE6, 12AE6A
12FX8	
12G4	
12G8	
12GA6	
12GC6	
12GN6	
12H4	
12H6	
12J5	12J5GT
12J5GT	12J5
12J7	12J7G, 12J7GT
12J7G	12J7, 12J7GT
12J7GT	12J7, 12J7G
12J8	
12K5	
12K7G	12K7GT
12K7GT	12K7G
12K8	12K8GT
12K8GT	12K8
12L6GT	12W6GT, 12EN6
12L8GT	
12Q7	12Q7G, 12Q7GT
12Q7G	12Q7, 12Q7GT
12Q7GT	12Q7, 12Q7G
12R5	
12S7	
12S8	12S8GT
12S8GT	12S8
12SA7	12SA7GT, 12SY7
12SA7GT	12SA7, 12SY7

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
12SC7	
12SF5	12SF5GT
12SF5GT	12SF5
12SF7	
12SG7	
12SH7	12SH7GT
12SH7GT	12SH7
12SJ7	12SJ7GT
12SJ7GT	12SJ7
12SK7	12SK7GT
12SK7GT	12SK7
12SL7GT	
12SN7GT	12SN7GTA, 12SX7GT
12SN7GTA	
12SQ7	12SQ7GT
12SQ7GT	12SQ7
12SR7	12SR7GT, 12SW7
12SR7GT	12SR7, 12SW7
12SW7	12SR7, 12SR7GT
12SX7GT	12SN7GT, 12SN7GTA
12SY7	12SA7, 12SA7GT
12U7	
12V6GT	
12W6GT	12EN6, 12L6GT
12X4	
12Z3	14Z3
12Z5	6Z5, 6Z5/12Z5
13	5X3, 80
13CM5	
13DE7	
13DR7	
13EC7	
13EM7	
13GC8	
14A4	

<i>To Replace</i>	<i>Use</i>
14A5	
14A7	14A7/12B7, 12B7, 14H7
14AF7	XXD
14B6	
14B8	
14C5	
14C7	
14DA7	
14E6	
14E7	
14F7	
14F8	
14G6	
14GT8	
14H7	12B7, 14A7/12B7, 14A7
14J7	
14K7	
14L7	
14N7	
14Q7	
14R7	
14S7	
14V7	
14W7	
14X7	
14Y4	
14Y7	
14Z3	12Z3
15	
15A6	
15A8	
15CW5	
15DQ8	
16	16B, 81
16A5	

* Parallel-filament circuits only.

§ May not work in all circuits.

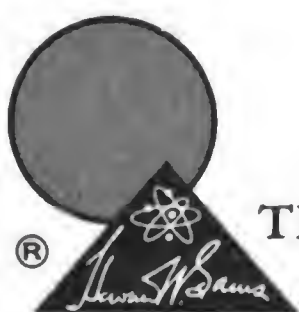
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CAT. NO. TUB-1

Howard W. Sams
**TUBE
SUBSTITUTION
handbook**

by

The Howard W. Sams Engineering Staff



HOWARD W. SAMS & CO., INC.

THE BOBBS-MERRILL COMPANY, INC.

Indianapolis • New York

<i>To Replace</i>	<i>Use</i>
16A8	
16B	16, 81
17AV5GA	
17AX4GT	17D4
17AX4GTA	
17BQ6GTB	17DQ6, 17DQ6A, 17DQ6B
17C5	17CU5, 17R5
17C8	
17CA5	
17CU5	17C5, 17R5
17D4	
17DE4	
17DQ6	17DQ6A, 17DQ6B
17DQ6A	17DQ6B
17DQ6B	
17EW8	
17H3	
17HC8	
17L6GT	
17R5	
18	
18A5	
18DZ8	
18FW6	
18FX6	
18FY6	
18GD6	
18GE6	
18HB8	
19	
19AQ5	
19AU4	19AU4GT, 19AU4GTA
19AU4GT	19AU4, 19AU4GTA
19AU4GTA	
19BG6G	19BG6GA

<i>To Replace</i>	<i>Use</i>
19BG6GA	19BG6G
19C8	19T8
19CL8A	
19CS4	
19D8	
19DE7	
19EA8	
19J6	
19T8	19C8
19V8	
19X3	
19X8	
19Y3	19X3
20	
21A6	21B6
21B6	21A6
21EX6	
22	
22DE4	
24A	24S
24S	24A
25	25S, 1B5, 1B5/25S
25A6	25A6G, 25A6GT
25A6G	25A6, 25A6GT
25A6GT	25A6, 25A6G
25A7GT	
25AC5G	25AC5GT
25AC5GT	25AC5G
25AV5GA	25AV5GT
25AV5GT	25AV5GA
25AX4GT	25D4
25B5	
25B6G	
25B8	25B8GT
25B8GT	25B8

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
25BK5	
25BQ6GA	25BQ6GTB, 25BQ6GTB/25CU6, 25CU6, 25DQ6, 25DQ6A
25BQ6GT	25BQ6GA, 25BQ6GTB, 25BQ6GTB/25CU6, 25CU6, 25DQ6, 25DQ6A
25BQ6GTB	25BQ6GTB/25CU6, 25CU6, 25DQ6, 25DQ6A
25BQ6GTB/ 25CU6	25BQ6GTB, 25CU6, 25DQ6, 25DQ6A
25C5	
25C6G	25C6GA
25C6GA	25C6G
25CA5	
25CD6G	25CD6GA, 25CD6GB, 25DN6
25CD6GA	25CD6GB, 25DN6
25CD6GB	
25CR5	
25CU6	25BQ6GTB/25CU6, 25BQ6GTB, 25DQ6, 25DQ6A
25D4	
25D8GT	
25DN6	25CD6GB
25DQ6	25DQ6A
25DQ6A	
25DT5	
25E5	
25EC6	25CD6GB
25EH5	
25F5	
25L6	25L6GT, 25C6G, 25C6GA, 25W6GT
25L6GT	25L6, 25C6G, 25C6GA, 25W6GT
25N6	25N6G
25N6G	25N6
25S	25, 1B5, 1B5/25S
25U4GT	25AX4GT, 25D4, 25W4GT

<i>To Replace</i>	<i>Use</i>
25W4GT	25U4GT, 25AX4GT, 25D4
25W6GT	25C6G, 26C6GA, 25L6, 25L6GT
25X6GT	
25Y4GT	
25Y5	25Z5
25Z4	
25Z5	25Y5
25Z6	25Z6G, 25Z6GT
25Z6G	25Z6, 25Z6GT
25Z6GT	25Z6, 25Z6G
26	
26A6	
26A7	26A7GT
26A7GT	26A7
26BK6	
26C6	
26CG6	
26D6	
26E6G	
26Z5	
27	27S, 56, 56S
27S	27, 56, 56S
28D7	
28Z5	
30	
30A5	
31	
31A3	
32	1B4P, 1B4T, 951
32A8	
32ET5	
32L7GT	
33	
34	
35	35/51, 35S, 35S/51S, 51, 51S

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
35/51	35, 51, 35S/51S, 35S, 51S
35A3	
35A5	
35B5	
35C3	
35C5	
35CD6GA	
35D5	
35DZ8	
35EH5	
35GL6	
35HB8	
35L6GT	
35S	35S/51S, 51S, 35/51, 35, 51
35S/51S	35S, 51S, 35/51, 35, 51
35W4	
35Y4	
35Z3	
35Z4GT	
35Z5G	35Z5GT
35Z5GT	35Z5G
35Z6G	
36	36A, 64*, 64A*
36A	36, 64*, 64A*
36AM3	
37	76, 56AS*
38	
38A3	
39	39/44, 44
39/44	39, 44
40	
40A1	
40B2	
40Z5	40Z5/45Z5GT, 45Z5GT
40Z5/45Z5GT	40Z5, 45Z5GT

<i>To Replace</i>	<i>Use</i>
41	
42	
43	
44	39, 39/44
45	45A
45A	45
45A5	
45B5	
45Z3	
45Z5GT	40Z5, 40Z5/45Z5GT
46	
47	
48	
49	
50	
50A1	
50A5	
50AX6G	
50B5	
50BK5	
50BM8	
50C5	
50C6G	50C6GA
50C6GA	50C6G
50CA5	
50CD6G	
50DC4	
50EH5	
50FE5	
50FY8	
50L6GT	
50X6	
50Y6G	50Y6GT
50Y6GT	50Y6G
50Y7GT	50Z7G, 50Z7GT

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
50Z6G	
50Z7G	50Z7GT, 50Y7GT
50Z7GT	50Z7G, 50Y7GT
51	51S, 35, 35/51, 35S/51S, 35S
51S	51, 35, 35/51, 35S/51S, 35S
52	
53	
55	55S
55N3	
55S	55
56	56S, 27, 27S
56AS	76*
56S	56, 27, 27S
57	57S
57AS	6C6*, 77*
57S	57
58	58S
58AS	6D6*, 78*
58S	58
59	
60E3	
64	64A, 36*, 36A*
64A	64, 36*, 36A*
65	65A
65A	65
67	67A, 37*, 37A*
67A	67, 37*, 37A*
68	68A
68A	68
70A7GT	
70L7GT	
75	75S
75S	75
76	37, 37A, 56AS*
77	6C6, 57AS*
78	6D6, 58AS

<i>To Replace</i>	<i>Use</i>
79	
80	5X3, 13
81	16, 16B
82	82V, 88
82V	82, 88
83	83V, 5Z3
83V	83, 5Z3
84/6Z4	6Z4
85	
85AS	
88	82, 82V
89	89Y
89Y	89
96	
117L7GT	117L7/M7GT, 117M7GT
117L7/M7GT	117L7GT, 117M7GT
117M7GT	117L7GT, 117L7/M7GT
117N7GT	
117P7GT	
117Z3	
117Z4GT	
117Z6G	117Z6GT
117Z6GT	117Z6G
182B/482B	71A
210T	10
401	
404A	
417A	
484	
807	
950	
951	1B4P, 1B4T, 32
954	
955	
956	
957	

* Parallel-filament circuits only.

§ May not work in all circuits.

<i>To Replace</i>	<i>Use</i>
958A	
959	
5642	
5879	
5881	6L6GC
6080	6AS7G, 6AS7GA
6267	
6550	
6973	
7025	7025A, 12AX7, 12AX7A, 12DF7, 12DT7, 12AD7*, 12DM7*
7025A	7025, 12AX7, 12AX7A, 12DF7, 12DT7, 12AD7*, 12DM7*
7027	7027A
7027A	
7189	7189A
7189A	
7199	
7247	12DW7
7355	
7382	
7408	6V6, 6V6GT, 6V6GTA
7543	6AU6, 6AU6A
7581	6L6GC
7591	
7695	
9001	
9002	
9003	
XXB	3C6
XXD	14AF7
XXFM	7X7
XXL	7A4
X155	6BC8, 6BQ7, 6BQ7A, 6BS8, 6BX8, 6BZ7, 6BZ8, 6CH7, 6CX7, 6BK7*, 6BK7A*, 6BK7B*

Section 2

INDUSTRIAL SUBSTITUTES FOR RECEIVING TUBES

In this section are those American receiving tubes that can be replaced by industrial types. The receiving tubes are listed in the left-hand column and their industrial substitutes in the right-hand column. Each tube listed has one or more substitutes. If a tube type does not appear in the listing, an industrial substitute is not recommended.

This substitution list should be used in one direction only—that is, an industrial type to replace a standard type. If the equipment is already designed for an industrial tube, a standard receiving tube will not usually work as efficiently or as long as the original.

Substitutes marked with an asterisk (*) should be used only when the filament of the original tubes is wired in a parallel circuit.

Engineering
TK
6065
4.5
1.1

FIRST EDITION

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TUBE SUBSTITUTION HANDBOOK

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<i>To Replace</i>	<i>Use</i>
OA2	OA2WA, 6073, 6626
OA4G	1267
OB2	OB2WA, 6074, 6627
OC3	OC3W
OD3	OD3W
OZ4A	1003
1B3	8016
1U4	5910
2A3	5930
5R4GY	5R4WGA, 5R4WGB, 5R4WGY
5U4G	5U4WG, 5931
5Y3GT	5Y3WGTA, 5Y3WGTB, 6087, 6106
5Z3	1275
6AC7	6AC7W, 6134
6AG5	6AG5WA, 6186
6AH6	6485
6AK5	6AK5W, 6AK5WA, 6AK5WB, 5654, 6096, 6968
6AL5	6AL5W, 5726, 6058, 6097, 6663
6AM5	6516
6AM6	6064
6AN5	6AN5WA
6AQ5	6AQ5W, 6009, 6094*, 6095, 6669
6AR6	6AR6WA, 6098, 6384
6AS6	6AS6W, 5725, 6187
6AS7G	6080, 6080WA, 6080WB, 6336, 6336A, 6520
6AT6	6066
6AU6	6AU6WA, 6AU6WB, 6136, 7543
6BA6	6BA6W, 5749, 6660
6BE6	6BE6W, 5750
6BF7	6BF7W
6BH6	6265*, 6661
6BJ6	6662
6BQ5	7189, 7189A, 7320

<i>To Replace</i>	<i>Use</i>
6BR7	6059
6BW6	6061
6C4	6C4W, 6C4WA, 6100, 6135
6C6	1221, 1223
6CB6	7732
6CH6	6132
6CL6	6677
6CQ6	6065
6F6	1611, 1621
6H6	6H6WGT
6J4	6J4WA
6J5	6J5WGT
6J6	6J6W, 6J6WA, 6099, 6101
6J7	1620
6L6	6L6WA, 6L6WGB, 1222, 1222A, 1614, 5881, 5932, 7581
6L7	1612
6Q7	6118
6SA7	5961
6SC7	6SC7GT
6SJ7	6SJ7WGT, 5693
6SK7	6137
6SL7	6SL7WGT, 5691*, 6113
6SN7GT	6SN7WGT, 6SN7WGTA, 5692
6SU7	6SU7GT, 6SU7WGT, 6188
6U8	6678, 7731
6V6	6V6GT, 5871, 5992*, 7408
6X4	6X4W, 6X4WA, 5993*, 6063, 6202
6X5	6X5WGT
7A6	5679
7F8	7F8W
12AT7	12AT7WA, 6060, 6021, 6679, 7728
12AU7	12AU7WA, 5814*, 5814A*, 5814WA, 6067, 6189, 6680, 7730
12AX7	5751*, 5751WA*, 6057, 6681, 7025, 7025A, 7729

* Parallel-filament circuits only.

<i>To Replace</i>	<i>Use</i>
12AY7	6072
12J5	12J5WGT
14C7	1280
25Z6	25Z6WGT
26E6G	26E6WG
26Z5	26Z5W
28D7	28D7W, 1238
30	1230
32	1229
404A	5847
417A	5842
955	5731

Section 3

EUROPEAN SUBSTITUTES FOR AMERICAN TYPES

This section lists American receiving tubes and their European substitutes. American tubes are in the left-hand column, with their European equivalents in the right-hand column. Only those American types which can be replaced with European brands have been listed. For a list of European types with American equivalents, refer to Section 4.

Substitutes marked with an asterisk (*) should be used only when the filament of the original tube is wired in a parallel circuit.

<i>To Replace</i>	<i>Use</i>
1C1	1R5
1C2	1AC6
1D13	1A3
1F2	1L4
1F3	1T4
1FD1	1AH5
1FD9	1S5
1P1	3C4
1P10	3S4
1P11	3V4
3G10	7E5
6D2	6AL5, 5726, 6058, 6097, 6663
6F10	6AC7, 6134
6F12	6AM6
6L12	6AQ8
6L34	6AQ4
6LD3	6CV7
6M2	6CD7
6P9	6BM5
6S5G	6E5
6Z31	6X4, 5993*, 6063
7D9	6AM5, 6516
7D10	6CH6, 6132
8D3	6AM6
8D5	6BR7, 6059
8D7	6BS7
9D6	6CQ6, 6065
17N8	17C8
19U3	19X3
20D3	12AH8
30C1	9A8
30L1	7AN7
62DDT	6CV7
63TP	6AB8
64SPT	6BX6

To Replace	Use
65ME	6BR5
66KU	6BT4
67PT	6CK5
108C1/OB2	OB2, 6074, 6627
141TH	14K7
150B2/6354	6354
150C2/OA2	OA2
150C3/OD3	OD3
171DDP	17C8
403B	5591, 6AK5*, 5654*, 6096*
451PT	45A5
A1834	6AS7G, 6080
A2521	6CR4
AX9003	5894
B36	12SX7GT
B65	6SN7WGT, 5692, 6180
B152	12AT7, 6060, 6201, 6679
B309	12AT7, 6060, 6201, 6679
B329/12AU7	12AU7, 5814, 6067, 6189, 6680
B339/12AX7	12AX7, 5751, 6057, 6681, 7025
B719/ECC85	6AQ8
BF61	6CK5
BF451	45A5
BPM04	6AQ5
D2M9	6AL5, 5726, 6058, 6097, 6663
D63	6H6
D77	6AL5, 5726, 6058, 6097, 6663
D152	6AL5, 5726, 6058, 6097, 6663
DA90/1A3	1A3
DAC32	1H5GT
DAF91/1S5	1S5
DAF92	1U5
DAF96/1AH5	1AH5
DCC90/3A5	3A5
DD7	6AM5, 6516

* Parallel-filament circuits only.

<i>To Replace</i>	<i>Use</i>
DDR7	6AM5, 6516
DF33	1N5GT
DF60/5678	5678
DF62/1AD4	1AD4
DF67	6008
DF91/1T4	1T4
DF92/1L4	1L4
DF96/1AJ4	1AJ4
DF97	1AN5
DH63	6Q7
DH77	6AT6, 6066
DH149	7C6
DH719/EABC80	6AK8
DK32	1A7GT
DK91/1R5	1R5
DK92	1AC6
DK96/1AB6	1AB6
DL33	3Q5GT
DL35	1C5GT
DL36	1Q5GT
DL67	6007
DL91	1S4
DL92/3S4	3S4
DL94/3V4	3V4
DL95	3Q4
DL96/3C4	3C4
DL620/5672	5672
DM70/1M3	1M3
DM71/1N3	1N3
DP61	6AK5, 5591*, 5654, 6096
E1C	955
E1F	954
E80CC/6085	6085
E80F/6084	6084
E80L/6227	6227

* Parallel-filament circuits only.

<i>To Replace</i>	<i>Use</i>
E80T/6218	6218
E81L/6686	6686
E83F/6689	6689
E88CC	6922, 6DJ8*
E90CC/5920	5920
E91H/6687	6687
E180CC	7062
E180F/6688	6688
E182CC/7119	7119
E188CC/7308	7308
EA52	6923
EAA91	6AL5, 5726, 6058, 6097, 6663
EABC80	6AK8
EA42	6CT7
EB34	6H6
EB91	6AL5, 5726, 6058, 6097, 6663
EBC41	6CV7
EBC81	6BD7
EBC90/6AT6	6AT6, 6066
EBC91/6AV6	6AV6, 6066
EBF32	6B8
EBF80/6N8	6N8
EBF83	6DR8
EBF89/6DC8	6DC8
EC80/6Q4	6Q4
EC81/6R4	6R4
EC86	6CM4
EC90/6C4	6C4, 6100, 6135
EC91/6AQ4	6AQ4
EC92/6AB4	6AB4
ECC35	6SL7*, 5691*, 6113*
ECC81/12AT7	12AT7, 6060, 6201, 6679
ECC82/12AU7	12AU7, 5814, 6067, 6189, 6680
ECC83/12AX7	12AX7, 5751, 6057, 6681, 7025
ECC85/6AQ8	6AQ8

* Parallel-filament circuits only.

<i>To Replace</i>	<i>Use</i>
ECC88/6DJ8	6DJ8, 6922*
ECC91/6J6	6J6, 6099, 6101
ECC189/6ES8	6ES8
ECF80/6BL8	6BL8
ECF82/6U8	6U8
ECH35	6E8G*
ECH81/6AJ8	6AJ8
ECL80/6AB8	6AB8
ECL82/6BM8	6BM8
ECL84/6DX8	6DX8
EF22	7G7
EF70	6487
EF71	5899, 5900
EF72	5840
EF73	6488
EF74	6391
EF80	6BX6
EF85/6BY7	6BY7
EF86	6267
EF89/6DA6	6DA6
EF91/6AM6	6AM6
EF92	6CQ6, 6065
EF93/6BA6	6BA6, 5749, 6660
EF94/6AU6	6AU6, 6136, 7543
EF95/6AK5	6AK5, 5591*, 5654, 6096
EF97	6ET6
EF98	6ES6
EF183/6EH7	6EH7
EF184/6EJ7	6EJ7
EH90	6CS6
EK32	6A8*
EK90/6BE6	6BE6, 5750
EL33	6M6G
EL34/6CA7	6CA7
EL38	6CN6

* Parallel-filament circuits only.

<i>To Replace</i>	<i>Use</i>
EL41	6CK5
EL71	5902
EL81	6CJ6
EL83	6CK6
EL84/6BQ5	6BQ5, 7320
EL85	6BN5
EL86/6CW5	6CW5
EL90/6AQ5	6AQ5, 6005, 6095
EL91	6AM5, 6516
EL360	6CM5
EL620	5672
EL821	6CH6, 6132
EM34/6CD7	6CD7
EM80/6BR5	6BR5
EM81/6DA5	6DA5
EM84/6FG6	6FG6
EM840	6FG6
EQ80	6BE7
EY70	5641
EY80	6U3
EY81	6R3
EY82	6N3
EY84	6374
EY88/6AL3	6AL3
EZ35/6X5G	6X5G
EZ40	6BT4
EZ80/6V4	6V4
EZ81/6CA4	6CA4
EZ90/6X4	6X4, 5993*, 6063
EZ91	6AV4
GZ30/5Z4	5Z4
H63	6F5GT
HABC80	19T8
HBC90/12AT6	12AT6
HBC91/12AV6	12AV6

* Parallel-filament circuits only.

<i>To Replace</i>	<i>Use</i>
HCH81	12AJ7
HD14	1H5GT
HF93/12BA6	12BA6
HF94	12AU6
HK90/12BE6	12BE6
HL90	19AQ5
HL92/50C5	50C5
HL94	30A5
HM04	6BE6, 5750
HY90/35W4	35W4
KT32	25L6, 6046
KT66	6L6GC, 7581
LZ319	9A8
M8079	6AL5, 5726, 6058, 6097, 6663
M8080	6C4WA, 6100, 6135
M8081	6J6WA, 6099, 6101
M8082	6AM5, 6516
M8083	6AM6
M8091	6374
M8100	6AK5W, 5591*, 5654, 6096
M8136	12AU7WA, 5814, 6067, 6189, 6680
M8137	12AX7, 5751, 6057, 6681, 7025
M8161	6CQ6, 6065
M8162	12AT7WA, 6060, 6201, 6679
M8163	6354
M8195	6267
M8196	6AS6W, 5725, 6187
M8212	6AL5W, 5726, 6058, 6097, 6663
N14	1C5GT
N17	3S4
N18	3Q4
N19	3V4
N77	6AL5, 5726, 6058, 6097, 6663
N78	6BJ5
N142	45A5

<i>To Replace</i>	<i>Use</i>
N144	6AM5, 6516
N147	6M6G
N150	6CK5
N152	21A6
N153	15A6
N154	16A5
N309/PL83	15A6
N329	16A5
N709	6BQ5, 7320
N727/6AQ5	6AQ5, 6005, 6095
OSW2190	6AC7, 6134
OSW2600	6AC7, 6134
OSW3109	6H6
OSW3110	6E5
PABC80	9AK8
PC86	4CM4
PCC84	7AN7
PCC85/9AQ8	9AQ8
PCC88	7DJ8
PCF80	9A8
PCF82	9U8
PCL82/16A8	16A8
PCL84	15DQ8
PL36	25E5
PL81	21A6
PL82	16A5
PL83	15A6
PL84	15CW5
PM04	6BA6, 5749, 6660
PM05	6AK5, 5591*, 5654, 6096
PM07	6AM6
PP6BG	6M6G
PY31	25Z4
PY80	19X3
PY82	19Y3

* Parallel-filament circuits only.

<i>To Replace</i>	<i>Use</i>
QA2406	12AT7, 6060, 6201, 6679
R16/1T2	1T2
R17	6157
R18	6374
R52	5Z4
RGN1503	7E5
SN1039A	5591
SP6	6AM6
TS52/ECC91	6J6, 6099, 6101
U37/1T2	1T2
U78	6X4, 5993*, 6063
U147	6X5G
U149	7Y4
U152	19X3
U154	19Y3
U709	6CA4
UBF80	17C8
UCH42	14K7
UCH81	19D8
UCL82/50BM8	50BM8
UF41	12AC5
UL41	45A5
UL84/45B5	45B5
UU9	6BT4
UY85	38A3
V2M70	6X4, 5993*, 6063
V61	6BT4
VP6	6CQ6, 6065
W17	1T4
W77	6CQ6, 6065
W719/EF85	6BY7
W727/6BA6	6BA6, 5749, 6660
WD142	12S7
X14	1A7GT
X17	1R5

* Parallel-filament circuits only.

<i>To Replace</i>	<i>Use</i>
X63	6A8
X148	7S7
X727/6BE6	6BE6, 5750
XCC189	4ES8
X719	6AJ8
Z14	1N5GT
Z63	6J7
Z77	6AM6
Z152	6BX6
Z300T/0A4G	0A4G
Z719	6BX6
Z729	6267
ZA2	954
ZD17	1S5
ZD152	6N8

Section 5

PICTURE TUBE SUBSTITUTES

This section lists all picture tubes, from the 10- to the 30-inch sizes. This listing is numerical-alphabetical, with the substitutes shown in the right-hand column. Substitutes are not recommended for some types and, for this reason, are not shown in many instances. The listing of a certain tube type as a substitute for another one does not necessarily mean the reverse is true. Always refer to the left-hand column for the original type number. Then find the substitute in the right-hand column.

Minor changes may be necessary when a picture tube is substituted. These changes are indicated by various symbols following the type number. The key to these symbols is given below. *Be absolutely certain* to refer to this key.

Key to Footnotes:

- * Omit ion trap.
- ** Add ion trap.
- ¹ Parallel-filament circuits only.
- ² Mechanical changes may be required.
- ³ A change of accelerator-grid voltage may be required.
- ⁴ A change of focusing voltage may be required.
- ⁵ A change of brightness-control voltage may be required.
- ⁶ Add high-voltage filter capacitor.
- ⁷ Ground the *Aquadag* coating.
- ⁸ Change the anode connector.
- ⁹ Change the ion trap.

<i>To Replace</i>	<i>Use</i>
10ABP4	10ABP4A, 10ABP4B, 10ABP4C
10ABP4A	10ABP4, 10ABP4B, 10ABP4C
10ABP4B	10ABP4, 10ABP4A, 10ABP4C
10ABP4C	10ABP4, 10ABP4A, 10ABP4B
10ADP4	
10AEP4	
10BP4	10BP4A, 10BP4C ⁹ , 10BP4D ⁹ , 10FP4*, 10FP4A*
10BP4A	10BP4, 10BP4C ⁹ , 10BP4D ⁹ , 10FP4*, 10FP4A*
10BP4C	10BP4 ⁹ , 10BP4A ⁹ , 10BP4D, 10FP4*, 10FP4A*
10BP4D	10BP4C, 10BP4 ⁹ , 10BP4A ⁹ , 10FP4*, 10FP4A*
10CP4	
10DP4	
10EP4	
10FP4	10FP4A, 10BP4**, 10BP4A**, 10BP4C**, 10BD4D**
10FP4A	10FP4, 10BP4**, 10BP4A**, 10BP4C**, 10BP4D**
10MP4	10MP4A
10MP4A	10MP4
10RP4	
12AP4	
12CP4	
12JP4	12RP4**
12KP4	12KP4A, 12ZP4**, 12ZP4A**
12KP4A	12KP4, 12ZP4**, 12ZP4A**
12LP4	12LP4A, 12LP4C, 12TP4 ⁶ , 12KP4*, 12KP4A*
12LP4A	12LP4, 12LP4C, 12KP4*, 12KP4A*, 12TP4 ⁶
12LP4C	12LP4, 12LP4A, 12KP4*, 12KP4A*, 12TP4 ⁶

<i>To Replace</i>	<i>Use</i>
12QP4	12QP4A, 12ZP4 ⁸ , 12ZP4A ⁸ , 12KP4 ^{8*} , 12KP4A ^{8*}
12QP4A	12QP4, 12ZP4 ⁸ , 12ZP4A ⁸ , 12KP4 ^{8*} , 12KP4A ^{8*}
12RP4	12JP4*
12TP4	12LP4 ⁷ , 12LP4A ⁷ , 12LP4C ⁷
12UP4	12UP4A, 12UP4B ⁹
12UP4A	12UP4, 12UP4B ⁹
12UP4B	12UP4 ⁹ , 12UP4A ⁹
12VP4	12VP4A
12VP4A	12VP4
12WP4	
12XP4	
12YP4	
12ZP4	12ZP4A, 12KP4*, 12KP4A*
12ZP4A	12ZP4, 12KP4*, 12KP4A*
14ACP4	
14AEP4	14ARP4 ^{3,5}
14AJP4	
14ARP4	14AEP4 ^{3,5}
14ASP4	
14ATP4	
14AUP4	14AW4P
14AWP4	14AUP4
14AZP4	
14BAP4	
14BP4	14BP4A, 14CP4, 14CP4A, 14EP4
14BP4A	14BP4, 14CP4, 14CP4A, 14EP4
14CP4	14CP4A, 14BP4, 14BP4A, 14EP4
14CP4A	14CP4, 14BP4, 14BP4A, 14EP4
14DP4	
14EP4	14BP4, 14BP4A, 14CP4, 14CP4A
14FP4	
14GP4	
14HP4	
14KP4	14KP4A

<i>To Replace</i>	<i>Use</i>
14KP4A	14KP4
14NP4	14NP4A, 14SP4, 14WP4*
14NP4A	14NP4, 14SP4, 14WP4*
14QP4	14QP4A
14QP4A	14QP4
14RP4	14RP4A
14RP4A	14RP4
14SP4	14NP4, 14NP4A, 14WP4*
14UP4	
14WP4	14ZP4
14XP4	14XP4A, 14AWP4*, ^{3,5} , 14AUP4*, ^{3,5}
14XP4A	14XP4, 14AWP4*, ^{3,5} , 14AUP4*, ^{3,5}
14ZP4	14WP4
15AP4	
15CP4	
15DP4	15DP4A
15DP4A	15DP4
15EP4	
15GP22	
15HP22	
16ABP4	
16ACP4	
16AEP4	
16AFP4	
16AP4	16AP4A, 16AP4B
16AP4A	16AP4, 16AP4B
16AP4B	16AP4, 16AP4A
16CP4	
16DP4	16DP4A
16DP4A	16DP4
16EP4	16EP4A, 16EP4B ⁹
16EP4A	16EP4, 16EP4B ⁹
16EP4B	16EP4 ⁹ , 16EP4A ⁹
16FP4	
16GP4	16GP4A, 16GP4B, 16GP4C

<i>To Replace</i>	<i>Use</i>
16GP4A	16GP4, 16GP4B, 16GP4C
16GP4B	16GP4, 16GP4A, 16GP4C
16GP4C	16GP4, 16GP4A, 16GP4B
16HP4	16HP4A
16HP4A	16HP4
16JP4	16JP4A
16JP4A	16JP4
16KP4	16KP4A, 16RP4, 16RP4A
16KP4A	16KP4, 16RP4, 16RP4A
16LP4	16LP4A, 16ZP4
16LP4A	16LP4, 16ZP4
16MP4	16MP4A
16MP4A	16MP4
16QP4	
16RP4	16RP4A, 16KP4, 16KP4A
16RP4A	16RP4, 16KP4, 16KP4A
16SP4	16SP4A, 16WP4 ^{3,5} , 16WP4A ^{3,5} , 16WP4B ^{3,5}
16SP4A	16SP4, 16WP4 ^{3,5} , 16WP4A ^{3,5} , 16WP4B ^{3,5}
16TP4	16UP4 ^{5,6}
16UP4	16TP4 ^{5,7}
16VP4	
16YP4	
16WP4	16WP4A ⁷ , 16WP4B ⁷ , 16SP4 ^{3,5} , 16SP4A ^{3,5}
16WP4A	16WP4B, 16WP4 ⁶ , 16SP4 ^{3,5} , 16SP4A ^{3,5}
16WP4B	16WP4A, 16WP4 ⁶ , 16SP4 ^{3,5} , 16SP4A ^{3,5}
16XP4	
16ZP4	16LP4, 16LP4A
17AP4	
17ASP4	
17ATP4	17ATP4A, 17AVP4, 17AVP4A
17ATP4A	17ATP4, 17AVP4, 17AVP4A
17AVP4	17AVP4A, 17ATP4, 17ATP4A
17AVP4A	17AVP4, 17ATP4, 17ATP4A

<i>To Replace</i>	<i>Use</i>
17BJP4	
17BKP4	17BKP4A, 17BSP4*
17BKP4A	17BKP4, 17BSP4*
17BMP4	17BUP4 ^{3,5} , 17CBP4 ^{3,5} , 17CLP4 ^{3,5}
17BNP4	
17BP4	17BP4A ⁷ , 17BP4B ⁷ , 17BP4C ⁷ , 17JP4
17BP4A	17BP4B, 17BP4C, 17JP4, 17BP4 ⁶
17BP4B	17BP4A, 17BP4C, 17JP4, 17BP4 ⁶
17BP4C	17BP4A, 17BP4B, 17JP4, 17BP4 ⁶
17BSP4	17CRP4 ^{3,5}
17BTP4	
17BUP4	17CBP4, 17BMP4 ^{3,5}
17BVP4	17BWP4* ² , 17CSP4* ²
17BWP4	17CSP4, 17BVP4** ²
17BZP4	17CAP4, 17CKP4
17CAP4	17BZP4, 17CKP4
17CBP4	17BUP4
17CDP4	
17CEP4	
17CFP4	
17CGP4	
17CKP4	17BZP4, 17CAP4
17CLP4	17BMP4 ^{3,5}
17CMP4	
17CNP4	
17CP4	17CP4A
17CP4A	17CP4
17CRP4	17BSP4 ^{3,5}
17CSP4	17BWP4, 17BVP4** ²
17CTP4	
17CUP4	
17CVP4	
17CXP4	
17CYP4	
17CZP4	

<i>To Replace</i>	<i>Use</i>
17DAP4	
17DBP4	
17DCP4	
17DEP4	
17DHP4	
17DJP4	17DCP4*
17DKP4	
17DLP4	
17DQP4	
17DRP4	
17DSP4	
17DTP4	
17DWP4	
17DXP4	
17EAP4	
17FP4	17FP4A
17FP4A	17FP4
17GP4	
17HP4	17HP4A, 17HP4B, 17RP4, 17RP4C
17HP4A	17HP4, 17HP4B, 17RP4, 17RP4C
17HP4B	17HP4, 17HP4A, 17RP4, 17RP4C
17JP4	17BP4, 17BP4A, 17BP4B, 17BP4C
17KP4	17KP4A
17KP4A	17KP4
17LP4	17LP4A, 17VP4, 17VP4B
17LP4A	17LP4, 17VP4, 17VP4B
17QP4	17QP4A, 17UP4, 17YP4
17QP4A	17QP4, 17UP4, 17YP4
17RP4	17RP4C, 17HP4, 17HP4A, 17HP4B
17RP4C	17RP4, 17HP4, 17HP4A, 17HP4B
17SP4	
17TP4	
17UP4	17QP4, 17QP4A, 17YP4
17VP4	17VP4B, 17LP4, 17LP4A
17VP4B	17VP4, 17LP4, 17LP4A

<i>To Replace</i>	<i>Use</i>
17YP4	17QP4, 17QP4A, 17UP4
19AP4	19AP4A, 19AP4B, 19AP4C, 19AP4D
19AP4A	19AP4, 19AP4B, 19AP4C, 19AP4D
19AP4B	19AP4, 19AP4A, 19AP4C, 19AP4D
19AP4C	19AP4, 19AP4A, 19AP4B, 19AP4D
19AP4D	19AP4, 19AP4A, 19AP4B, 19AP4C
19DP4	19DP4A
19DP4A	19DP4
19EP4	
19FP4	
19GP4	
19JP4	
19QP4	
19TP22	
19VP22	
20BP4	
20CP4	20CP4B, 20CP4C, 20DP4, 20DP4B, 20CP4A ⁷ , 20CP4D ⁷ , 20DP4A ⁷ , 20DP4C ⁷
20CP4A	20CP4D, 20DP4A, 20DP4C, 20CP4 ⁶ , 20CP4B ⁶ , 20CP4C ⁶ , 20DP4 ⁶ , 20DP4B ⁶
20CP4B	20CP4, 20CP4C, 20DP4, 20DP4B, 20CP4A ⁷ , 20CP4D ⁷ , 20DP4A ⁷ , 20DP4C ⁷
20CP4C	20CP4, 20CP4B, 20DP4, 20DP4B, 20CP4A ⁷ , 20CP4D ⁷ , 20DP4A ⁷ , 20DP4B ⁷
20CP4D	20CP4A, 20DP4A, 20DP4C, 20CP4 ⁶ , 20CP4B ⁶ , 20CP4C ⁶ , 20DP4 ⁶ , 20DP4B ⁶
20DP4	20DP4B, 20CP4, 20CP4B, 20CP4C, 20DP4A ⁷ , 20DP4C ⁷ , 20CP4A ⁷ , 20CP4D ⁷
20DP4A	20DP4C, 20CP4A, 20CP4D, 20DP4 ⁶ , 20DP4B ⁶ , 20CP4 ⁶ , 20CP4B ⁶ , 20CP4C ⁶

<i>To Replace</i>	<i>Use</i>
20DP4B	20DP4, 20CP4, 20CP4B, 20CP4C, 20DP4A ⁷ , 20DP4C ⁷ , 20CP4A ⁷ , 20CP4D ⁷
20DP4C	20DP4A, 20CP4A, 20CP4D, 20DP4 ⁶ , 20DP4B ⁶ , 20CP4 ⁶ , 20CP4B ⁶ , 20CP4C ⁶
20FP4	
20GP4	
20HP4	20HP4B, 20HP4C, 20HP4A ⁷ , 20HP4D ⁷ , 20LP4 ⁷ , 20MP4 ⁷
20HP4A	20HP4D, 20LP4, 20MP4, 20HP4 ⁶ , 20HP4B ⁶ , 20HP4C ⁶
20HP4B	20HP4, 20HP4C, 20HP4A ⁷ , 20HP4D ⁷ , 20LP4 ⁷ , 20MP4 ⁷
20HP4C	20HP4, 20HP4B, 20HP4A ⁷ , 20HP4D ⁷ , 20LP4 ⁷ , 20MP4 ⁷
20HP4D	20HP4A, 20LP4, 20MP4, 20HP4 ⁶ , 20HP4B ⁶ , 20HP4C ⁶
20JP4	
20LP4	20MP4, 20HP4A, 20HP4D, 20HP4 ⁶ , 20HP4B ⁶ , 20HP4C ⁶
20MP4	20LP4, 20HP4A, 20HP4D, 20HP4 ⁶ , 20HP4B ⁶ , 20HP4C ⁶
21ACP4	21ACP4A, 21AMP4, 21AMP4A, 21BSP4, 21AQP4 ⁶ , 21AQP4A ⁶
21ACP4A	21ACP4, 21AMP4, 21AMP4A, 21BSP4, 21AQP4 ⁶ , 21AQP4A ⁶
21AFP4	
21ALP4	21ALP4A, 21ALP4B, 21ATP4, 21ATP4A, 21ATP4B, 21BTP4, 21BAP4*, 21BNP4*
21ALP4A	21ALP4, 21ALP4B, 21ATP4, 21ATP4A, 21ATP4B, 21BTP4, 21BAP4*, 21BNP4*
21ALP4B	21ALP4, 21ALP4A, 21ATP4, 21ATP4A, 21ATP4B, 21BTP4, 21BAP4*, 21BNP4*

<i>To Replace</i>	<i>Use</i>
21AMP4	21AMP4A, 21ACP4, 21ACP4A, 21BSP4, 21AQP4 ⁶ , 21AQP4A ⁶
21AMP4A	21AMP4, 21ACP4, 21ACP4A, 21BSP4, 21AQP4 ⁶ , 21AQP4A ⁶
21ANP4	21ANP4A
21ANP4A	21ANP4
21AP4	
21AQP4	21AQP4A, 21ACP4 ⁷ , 21ACP4A ⁷ , 21AMP4 ⁷ , 21AMP4A ⁷ , 21BSP4 ⁷
21AQP4A	21AQP4, 21ACP4 ⁷ , 21ACP4A ⁷ , 21AMP4 ⁷ , 21AMP4A ⁷ , 21BSP4 ⁷
21ARP4	21ARP4A
21ARP4A	21ARP4
21ASP4	
21ATP4	21ATP4A, 21ATP4B, 21ALP4, 21ALP4A, 21ALP4B, 21BTP4, 21BAP4*, 21BNP4*
21ATP4A	21ATP4, 21ATP4B, 21ALP4, 21ALP4A, 21ALP4B, 21BTP4, 21BAP4*, 21BNP4*
21ATP4B	21ATP4, 21ATP4A, 21ALP4, 21ALP4A, 21ALP4B, 21BTP4, 21BAP4*, 21BNP4*
21AUP4	21AUP4A, 21AUP4B, 21AVP4, 21AVP4A, 21AVP4B, 21BCP4*
21AUP4A	21AUP4, 21AUP4B, 21AVP4, 21AVP4A, 21AVP4B, 21BCP4*
21AUP4B	21AUP4, 21AUP4A, 21AVP4, 21AVP4A, 21AVP4B, 21BCP4*
21AVP4	21AVP4A, 21AVP4B, 21AUP4, 21AUP4A, 21AUP4B, 21BCP4*
21AVP4A	21AVP4, 21AVP4B, 21AUP4, 21AUP4A, 21AUP4B, 21BCP4*
21AVP4B	21AVP4, 21AVP4A, 21AUP4, 21AUP4A, 21AUP4B, 21BCP4*

<i>To Replace</i>	<i>Use</i>
21AWP4	
21AXP22	
21AXP22A	
21AYP4	21XP4, 21XP4A
21BAP4	21BNP4, 21CVP4
21BCP4	21BDP4, 21AUP4**, 21AUP4A**, 21AUP4B**, 21AVP4**, 21AVP4A**, 21AVP4B**
21BDP4	21BCP4, 21AUP4**, 21AUP4A**, 21AUP4B**, 21AVP4**, 21AVP4A**, 21AVP4B**
21BNP4	21BAP4, 21CVP4
21BSP4	21ACP4, 21ACP4A, 21AMP4, 21AMP4A, 21AQP4 ⁶ , 21AQP4A ⁶
21BTP4	21ALP4, 21ALP4A, 21ALP4B, 21ATP4, 21ATP4A, 21ATP4B, 21BAP4*, 21BNP4*
21CBP4	21CBP4A, 21CHP4 ^{3,5} , 21CXP4 ^{3,5} , 21DSP4 ^{3,5}
21CBP4A	21CBP4, 21CHP4 ^{3,5} , 21CXP4 ^{3,5} , 21DSP4 ^{3,5}
21CDP4	21CDP4A, 21CKP4*
21CDP4A	21CDP4, 21CKP4*
21CEP4	21CEP4A
21CEP4A	21CEP4
21CGP4	
21CHP4	21CXP4 ³ , 21DSP4 ³ , 21CBP4 ^{3,5} , 21CBP4A ^{3,5}
21CKP4	
21CLP4	
21CMP4	
21CQP4	21CSP4 ¹
21CSP4	21CQP4 ¹
21CUP4	

<i>To Replace</i>	<i>Use</i>
21CVP4	21BAP4, 21BNP4
21CWP4	
21CXP4	21CHP4 ³ , 21CBP4 ^{3,5} , 21CBP4A ^{3,5}
21CYP22	
21CYP22A	
21CZP4	21DEP4, 21DEP4A, 21DAP4 ^{4,5}
21DAP4	21CZP4 ^{4,5} , 21DEP4 ^{4,5} , 21DEP4A ^{4,5}
21DEP4	21DEP4A, 21CZP4, 21DAP4 ^{4,5}
21DEP4A	21DEP4, 21CZP4, 21DAP4 ^{4,5}
21DFP4	21DWP4 ⁵
21DHP4	
21DJP4	
21DKP4	21DKP4A
21DKP4A	21DKP4
21DLP4	
21DMP4	
21DNP4	
21DP4	21MP4 ⁴
21DQP4	
21DRP4	
21DSP4	21CHP4 ³ , 21CBP4 ^{3,5} , 21CBP4A ^{3,5}
21DVP4	
21DWP4	21CEP4 ⁵ , 21CEP4A ⁵ , 21DFP4 ⁵
21EAP4	
21ELP4	
21EMP4	
21ENP4	
21EP4	21EP4A ⁷ , 21EP4B ⁷
21EP4A	21EP4 ⁶ , 21EP4B
21EP4B	21EP4 ⁶ , 21EP4A
21EQP4	
21ERP4	
21ESP4	
21EVP4	
21EWP4	

<i>To Replace</i>	<i>Use</i>
21EXP4	
21EYP4	
21FAP4	
21FP4	21FP4A ⁷ , 21FP4C ⁷
21FP4A	21FP4 ⁶ , 21FP4C
21FP4C	21FP4 ⁶ , 21FP4A
21JP4	21JP4A
21JP4A	21JP4
21KP4	21KP4A ⁷
21KP4A	21KP4 ⁶
21MP4	
21WP4	21WP4A
21WP4A	21WP4
21XP4	21XP4A, 21AYP4
21XP4A	21XP4, 21AYP4
21YP4	21YP4A
21YP4A	21YP4
21ZP4	21ZP4A ⁷ , 21ZP4B ⁷
21ZP4A	21ZP4B, 21ZP4 ⁶
21ZP4B	21ZP4A, 21ZP4 ⁶
22AP4	22AP4A
22AP4A	22AP4
23BP4	
23CP4	
23DP4	
23EP4	
23FP4	
23GP4	
23HP4	
23JP4	
23KP4	23KP4A
23KP4A	
23RP4	
23SP4	
23TP4	

<i>To Replace</i>	<i>Use</i>
23UP4	
23VP4	
24ADP4	24CP4, 24CP4A, 24QP4, 24TP4, 24VP4, 24VP4A
24AEP4	
24AHP4	24ALP4, 24BAP4 ³
24AJP4	24ATP4
24ALP4	24AHP4, 24BAP4 ³
24AMP4	
24ANP4	24DP4, 24DP4A, 24YP4, 24AEP4*, 24ZP4*
24AP4	24AP4A, 24AP4B
24AP4A	24AP4, 24AP4B
24AP4B	24AP4, 24AP4A
24AQP4	
24ASP4	
24ATP4	24AJP4
24AUP4	
24AVP4	
24AXP4	
24BAP4	24AHP4 ³ , 24ALP4 ³
24BP4	
24CP4	24CP4A, 24ADP4, 24QP4, 24TP4, 24VP4, 24VP4A
24CP4A	24CP4, 24ADP4, 24QP4, 24TP4, 24VP4, 24VP4A
24DP4	24DP4A, 24ANP4, 24YP4, 24AEP4*, 24ZP4*
24DP4A	24DP4, 24ANP4, 24YP4, 24AEP4*, 24ZP4*
24QP4	24ADP4, 24CP4, 24CP4A, 24TP4, 24VP4, 24VP4A
24TP4	24ADP4, 24CP4, 24CP4A, 24QP4, 24VP4, 24VP4A

<i>To Replace</i>	<i>Use</i>
24VP4	24VP4A, 24ADP4, 24CP4, 24CP4A, 24QP4, 24TP4
24VP4A	24VP4, 24ADP4, 24CP4, 24CP4A, 24QP4, 24TP4
24XP4	24ADP4, 24CP4, 24CP4A, 24QP4, 24TP4, 24VP4, 24VP4A
24YP4	24ANP4, 24DP4, 24DP4A, 24AEP4*, 24ZP4*
24ZP4	24AEP4, 24ANP4**, 24DP4**, 24DP4A**, 24YP4**
27AP4	
27EP4	27GP4, 27NP4', 27RP4'
27GP4	27EP4, 27NP4', 27RP4'
27LP4	
27MP4	
27NP4	27RP4, 27EP4 ⁶ , 27GP4 ⁶
27RP4	27NP4, 27EP4 ⁶ , 27GP4 ⁶
27SP4	27UP4
27UP4	27SP4
27VP4	
27WP4	
30BP4	

—NOTES—

SECTION 1 — RECEIVING TUBES

— NOTES —

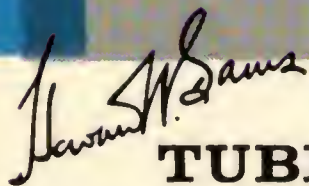
SECTION 2 — RECEIVING-INDUSTRIAL

SECTION 3 — AMERICAN-EUROPEAN

—NOTES—

SECTION 4 — EUROPEAN-AMERICAN

SECTION 5 — PICTURE TUBES



TUBE SUBSTITUTION handbook

Howard W. Sams Tube Substitution Handbook fills the need often experienced by service technicians confronted with the necessity for making suitable tube replacements. The book lists over 1,500 American receiving tubes, including over 300 which can be replaced by European types. Also listed are 400 picture tubes, 179 European tubes that can be replaced by American types, and 78 receiving tubes that can be replaced by industrial types. Compiled by the engineering staff of Howard W. Sams & Co., Inc., this book is an invaluable reference for the service technician.



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